

HONGO *et al.* - 09/815,305

Attorney Docket No. 040258-0279274

- Amendment -

IN THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application.

1. - 25. (Cancelled).

26. (Currently Amended) A plasma processing apparatus for applying a plasma process to an object to be processed, the plasma processing apparatus comprising:

a process chamber in which the object to be processed is subjected to the plasma process;

a plasma source that generates plasma;

a gas introducing ~~portion~~ ring configured to introduce a gas into the process chamber;

a gas supply line connected to the gas introducing portion so as to supply the gas to said gas introducing portion;

a first vacuum device connected to the process chamber so as to evacuate a volume inside the process chamber;

a second vacuum device connected to a gas exhaust line so as to evacuate a volume inside the gas introducing ~~portion~~ ring without passing through said gas supply line,

wherein the gas introducing ~~portion comprises:~~ ring forms an annular passage to distribute the gas to a plurality of gas nozzles facing inside said process chamber, the gas introducing ring including:

an inlet port opening to the annular passage and connected to said gas supply line so as to supply the gas to the annular passage; and

an outlet port opening to the annular passage and connected to said gas exhaust line, the outlet port opening at a position different from a position at which the inlet port opens.

HONGO *et al.* -- 09/815,305

Attorney Docket No. 040258-0279274

- Amendment -

27. *(Previously Presented)* The plasma processing apparatus as claimed in claim 26, wherein the gas introducing portion is configured as either:

- (a) a radial flow type in which the gas flows from a center to a periphery; or
- (b) a showerhead type in which the gas flows through a plurality of apertures provided in a surface of the showerhead facing the object to be processed.

28. *(Previously Presented)* The plasma processing apparatus as claimed in claim 26, wherein the outlet port has a diameter larger than a diameter of the gas nozzles.

29. *(Previously Presented)* The plasma processing apparatus as claimed in claim 28, wherein said first passage is an annular passage is connected to the inlet port and the gas nozzles, and the gas nozzles are located along the annular passage at substantially equal intervals.

30. *(Cancelled).*

31. *(Previously Presented)* The plasma processing apparatus as claimed in claim 26, further comprising a slot antenna having a plurality of slits configured and arranged to guide a microwave having a predetermined frequency which is determined by the plasma process to be applied to the object to be processed.

32. *(Previously Presented)* The plasma processing apparatus as claimed in claim 31, wherein a density of the slits is substantially uniform in a radial direction of said slot antenna.

33. *(Withdrawn)* A gas introducing portion adapted to introduce a gas into a process chamber of a processing apparatus, the gas introducing portion comprising:
a plurality of circumferentially arranged gas nozzles through which the gas is introduced into the process chamber;
an inlet port through which the gas is supplied; and

HONGO *et al.* -- 09/815,305

Attorney Docket No. 040258-0279274

- Amendment -

an outlet port through which the gas is evacuated from the gas introducing portion,

wherein a diameter of the outlet port is larger than a diameter of the gas nozzles.

34. (*Withdrawn*) The gas introducing portion as claimed in claim 33, being configured as either:

- (a) a radial flow type in which the gas flows from a center to a periphery; or
- (b) a showerhead type in which the gas flows through a plurality of apertures provided in a surface of the showerhead facing the object to be processed.

35. (*Withdrawn*) The gas introducing portion as claimed in claim 34, further comprising an annular passage through which the gas flows.

36. (*Withdrawn*) The gas introducing portion as claimed in claim 35, wherein the annular passage is connected to the inlet port, the outlet port, and the gas nozzles, and the gas nozzles are located along the annular passage at substantially equal intervals.

37. (*Currently Amended*) A plasma processing apparatus for applying a plasma process to an object to be processed, the plasma processing apparatus comprising:

a process chamber in which the object to be processed is subjected to the plasma process;

a plasma source that generates plasma;

a gas introducing ~~portion~~ ring configured to supply a gas into the process chamber;

a gas supply line connected to the gas introducing portion so as to supply the gas to said gas introducing portion;

a vacuum device configured to evacuate a volume inside the process chamber;

HONGO *et al.* -- 09/815,305

Attorney Docket No. 040258-0279274

- Amendment -

a bypass line having a first end connected to the gas introducing portion and a second end connected to the vacuum device so as to evacuate a volume inside the gas introducing portion ring,

wherein the gas introducing portion ~~comprises:~~ ring forms an annular passage to distribute the gas to a plurality of gas nozzles facing inside said process chamber, the gas introducing ring including:

an inlet port opening to the annular passage and connected to said gas supply line so as to supply the gas to the annular passage; and

an outlet port opening to the annular passage and connected to said bypass line, the outlet port opening at a position different from a position at which the inlet port opens.

38. *(Previously Presented)* The plasma processing apparatus as claimed in claim 37, wherein the gas introducing portion is configured as either:

- (a) a radial flow type in which the gas flows from a center to a periphery; or
- (b) a showerhead type in which the gas flows through a plurality of apertures provided in a surface of the showerhead facing the object to be processed.

39. *(Previously Presented)* The plasma processing apparatus as claimed in claim 37, wherein the outlet port has a diameter larger than a diameter of the gas nozzles.

40. *(Previously Presented)* The plasma processing apparatus as claimed in claim 39, wherein said first passage is an annular passage connected to the inlet port and the gas nozzles, and the gas nozzles are located along the annular passage at substantially equal intervals.

41. *(Cancelled).*

42. *(Previously Presented)* The plasma processing apparatus as claimed in claim 37, further comprising a slot antenna having a plurality of slits

HONGO *et al.* — 09/815,305

Attorney Docket No. 040258-0279274

- Amendment -

configured and arranged to guide a microwave having predetermined frequency which is determined by the plasma process to be applied to the object to be processed.

43. (*Previously Presented*) The plasma processing apparatus as claimed in claim 42, wherein a density of the slits is substantially uniform in a radial direction of said slot antenna.

44. (*Currently Amended*) A plasma processing apparatus for applying a plasma process to an object to be processed, the plasma processing apparatus comprising;

a process chamber in which the object to be processed is subjected to the plasma process;

a gas introducing ~~portion~~ ring provided to the process chamber so as to introduce a reactant gas into said process chamber;

a gas supply line connected to said gas introducing portion so as to supply the reactant gas to the gas introducing portion:

a gas exhaust line connected to said gas introducing ~~portion~~ ring;

a first vacuum pump connected to said process chamber so as to evacuate gas from said process chamber so that said process chamber is maintained at a negative pressure; and

a second vacuum pump connected to said gas exhaust line so as to evacuate the reactant gas from said gas introducing ~~portion~~ ring through said gas exhaust line;

wherein the gas introducing ring forms an annular passage to distribute the reactant gas to a plurality of gas nozzles facing inside said process chamber, the gas introducing ring including:

an inlet port opening to the annular passage and connected to said gas supply line so as to supply the reactant gas to the annular passage; and

an outlet port opening to the annular passage and connected to said gas exhaust line, the outlet port opening at a position different from a position at which the inlet port opens.

HONGO et al. -- 09/815,305**Attorney Docket No. 040258-0279274****- Amendment -**

45. *(Previously Presented)* The plasma processing apparatus as claimed in claim 44, wherein said gas introducing portion has an annular shape and is incorporated into a sidewall of said process chamber, said gas introducing part has a plurality of circumferentially arranged nozzles through which the reactant gas is introduced into said process chamber.